Many of the researchers assumed that attention, learning and memory are inextricably connected. Learning is considered as a modification in action which is resulted from experiences, memory is the consequence of experience, and both are influenced by attention. It can be said that if nothing occurs in memory, learning will never exist; in opposition, anything occurs in memory leads to learning (Massaro & Cowan, 1993; Anderson, 1993).

Attention influences the assimilation and transmission of the information being attended, but it is affected by many aspects involving the importance of the novel stimuli to the learner, the likeness between contending thoughts or stimuli, the difficulty of the novel information, and the physical capability of an individual for being attentive, (Treisman, as cited in Driscoll, 2001). Samuel Johnson once said, "The true art of memory is the art of attention" (Klatzky, 1984). The activity that captures one’s attentiveness and involves the mind has the capacity to generate learning. It is well said that no attention, no engagement, no learning. Thus, the first and foremost step in learning and memorizing significant information is to focus attention.

Several researches have examined the direct effect of mindfulness on attention, learning and memory. However, mindfulness is a skill which enhances moment to moment awareness, non-judgemental attitude and keeps one in present reality with acceptance. Negative effects like stress, anxiety, depression are significantly reduced through the mindfulness practices and positive effect like increased resilience, well-being and calmness occurred. Consequently, mindfulness practices increased the potentiality to retain things, make more attentive and learning outcomes are also facilitated. In present research an attempt has been made to improve the attention, learning and memory with the help of training modules of mindfulness.

“Being mindful requires the person to attend, to be consciously aware of, the emergent nature of phenomena in consciousness, and to recognize the nature of attachments made to these phenomena as they occur” Hirst (2003). Langer (2009) proposed that mindfulness “makes clear that things change and loosen the grip of our evaluative
mindsets so that these changes need not be feared”. Witkiewitz and Marlatt (2005) described mindfulness as a meta-cognitive state of non-judgemental awareness which concentrates on each and every moment or experience of ongoing thoughts, feelings and physical sensations. They conceptualized that in mindfulness, attention is paid on the breath as a touchstone of awareness and if an individual got diverted, can again focuses his attention on the breath immediately and also recognize that consciousness is transferred to other cognitive actions.

In the light of basic nature of mindfulness and its consequences it is expected that mindfulness practices are helpful in increasing and maintaining the capacity and flexibility of attention, learning and memory. Gunaratana, (1993) & Kapleau, (1965) claimed that mindfulness practices could have positive impact on cognitive abilities involving attention, memory and other cognitive functions. Beauchemin, Hutchins and Patterson (2008) pointed out that adolescent with learning difficulties improved with mindfulness meditation program. In addition, Raes, Dewulf, Van Heeringen, & Williams (2009) noted that mindfulness training is significantly linked with psychological benefits and reduced cognitive reactivity and Kumar, Feldman, & Hayes (2008) pointed that it helps in decreasing avoidance and rumination processes.

In the light of ongoing discussion, the present study was undertaken to examine the relationship between attention, learning and memory, gender differences and role of mindfulness on attention, learning and memory. Hence, the problem of the present study is stated as “EFFECT OF MINDFULNESS ON ATTENTION, LEARNING AND MEMORY AMONG ADOLESCENTS”.

MAIN OBJECTIVES OF THE STUDY

1) To study the relationship between Attention and Memory.
2) To study the relationship between Attention and Learning.
3) To study the relationship between Learning and Memory.
4) To examine the effect of Mindfulness on Attention.
5) To examine the effect of Mindfulness on Learning.
6) To examine the effect of Mindfulness on Memory.
7) To study the difference in Attention between boys and girls.
8) To study the difference in Learning between boys and girls.

9) To study the difference in Memory between boys and girls.

SPECIFIC HYPOTHESES

1) There will be significant relationship between Attention and Memory.

2) There will be significant relationship between Attention and Learning.

3) There will be significant relationship between Learning and Memory.

4) There will be significant effect of Mindfulness on Attention.

5) There will be significant effect of Mindfulness on Learning.

6) There will be significant effect of Mindfulness on Memory.

7) There will be significant difference in Attention between boys and girls.

8) There will be significant difference in Learning between boys and girls.

9) There will be significant difference in Memory between boys and girls.

METHOD

SAMPLE

The sample of 600 subjects for the present study was drawn from various schools of Hisar district in Haryana. A total of 600 subjects were drawn and equal numbers of male and female subjects were taken in sample for the study. After the screening of 600 subjects, 60 subjects were chosen for intervention having low level of attention, learning and memory. The age of subjects ranged between 13 to 16 years.

MEASURING INSTRUMENTS

The measures used in the study were selected in accordance with the objectives of the study. These measures are related to both verbal and non-verbal tests which were selected to assess the variables of the study such as intelligence, attention, learning and memory. The brief description of the measures used in the study is as under:

A). Standard Progressive Matrices (Raven, Court and Raven, 1996)

B). The d2 Attention Test (Brickenkamp & Zillmer, 1998)

C). Serial Learning (Janbandhu & Deshmukh, 1985)
D). Digit Span Memory Test from Wechsler Intelligence Scale for Children III (Weschler, 1992)

ADMINISTRATION OF TESTS

The subjects were administered above described tests namely the standard progressive matrices, the d2 attention test, serial learning and digit span memory test. The subjects were approached directly in their institutions for data collection. They were tested in small groups ranging from 10 to 15 subjects or individually after obtaining their willingness to participate in the study.

The general testing conditions were satisfactory and atmosphere was uniform all through. Subjects were encouraged to respond in a realistic way without rumination on all tests too much. A good rapport was established with them in order to get real position on the measuring instruments. They were told about the importance of the study and that the data collected will not be made public, rather confidentiality of their responses will be maintained. Subjects were informed that their position on different behavioral measures would be intimated to them, if they desire so. Though there was no time limit, subjects were asked to complete the tests as early as possible. They generally completed serial learning task in 15 to 30 minutes, intelligence in 20 to 30 minutes, and digit span in 10 to 20 minutes and the d2 test is a timed test in which 20 seconds per line are allowed. The instructions and administration procedures were same for all the subjects, and in accordance with described by the respective test authors.

PROCEDURE

Before the beginning of intervention, the sample screening was done on a sample of 600 students. For measuring intelligence, standard progressive matrices by Raven, Court & Raven (1996) has been administered. In present research, intelligence has been used as a control variable to know about the normal IQ of the subjects. For the measurement of attention, the d2 attention test by Brickenkamp & Zillmer, (1998), for learning, serial learning by Janbandhu and Deshmukh (1985) and digit span memory test by Weschler (1992) for the assessment of memory have been administered on students. These pretest tools were administered on students to measure the levels of decided dependent variables. The mindfulness procedure was being applied for a period of 6 months on students (N=60) having low score in attention, learning and memory.
After 6 months’ training program, post testing was done on all the three variables i.e. attention, learning and memory.

Before Mindfulness practice, an orientation program for fifteen days has been designed for the subjects with the help of breathing exercises and imaginary techniques. At initial level, students were instructed to concentrate their attention towards the things present in their environment with the help of breathing exercise and imaginary techniques. Firstly they were instructed to notice and observe whatever sounds they heard from the external environment for example, sound of footsteps of passing person outside the room, ringing of bell, chirping of birds, any type of vehicle sound, sound of bench, noise of door etc. This procedure has been continued for a week for approx. 30-40 minutes per day. After that, students were asked to observe the movements of the children sitting around them, like sound of scrapping, sound of yawning, coughing. This procedure continued for seven days. In next session, with closed eyes they were asked to focus the attention on their own actions for instance, shaking of body, movement of hands, changing of body position etc.

After an orientation program, mindfulness training was imparted to the students. Mindfulness training focuses on various aspects such as external environment, understanding of the body, giving attention to thoughts, feelings and mind and meditative exercise. The following are some exercises which were adopted by subjects during 6 months intervention program.

1. **Mindfulness of the Environment:** At initial level, Mindfulness Training directed the attention of the subjects towards the things present in their environment. The following two exercises were introduced in this section.

   A) **Awareness of objects:** In first exercise, subjects were shown an object (e.g. clock, scenery) and asked to draw it. They were educated to spend their time by observing the object and focusing attention to minor and major details. Next day, same procedure was repeated. They were instructed to compare the drawings and were also asked to recognize the missing details of the first drawing that they memorized in the second time. This procedure was followed for seven days for 30-40 minutes a day.

   B) **Awareness of self in the environment:** In this exercise subjects were asked to focus attention on themselves or their experiences in the environment. This
session was conducted in evening in which subjects were instructed to remember and put in writing all the moments and activities step by step which they did from morning to evening. They repeated this exercise for seven days and paid attention to their whole day activities and added new things from the previous one.

2. Mindfulness of the Body: The next exercise was to focus on their body awareness. This session follows three steps:

A) Attending the Senses: The raisin meditation: This step involves awareness of personal experiences of an object. For example, subjects were given 3 raisins and instructed to bring their attention on first raisin and observe carefully as if they had never seen it before. They were asked to observe the thoughts and feelings regarding raisin while looking at it. After that they were asked to smell the raisin, and put it into their mouth, chew that slowly and feel the actual taste. They were instructed to consciously experience their all thoughts, feelings, smell and taste of the raisin. Later, they were instructed to repeat the same procedure with second raisin considering it as the first raisin which they have ever seen. Same procedure was followed with third raisin. This exercise was also continued for seven days with another small food items such as popcorn, almonds and chocolate etc.

B) Awareness of movement: In this step subjects were asked to pay attention to their own body while interacting with environment. They were instructed to move around the room and to become aware of each movement of their body posture e.g. feeling the movement of thigh muscles, movement of hands and arms and realizing each and every movement of footsteps from the floor and setting it in return. It was also noticed that they were moving slowly or fastly at times. They were also instructed that if their thoughts begin to wander from their body, they should observe it and return their attention on their body parts.

C) Meditation on the breath: This 10 days exercise begins with a simple practice of breathing exercise. In this step subjects were asked to notice the movement of their breath in all parts of their body (lungs, stomach, ribs, chest, and shoulder). They were asked to be aware of the natural rhythm of the breath, how fresh air comes into the nose and warm air is breathed out. Later on, subjects were
instructed to count how many breath they inhaled. One breath equals one inhalation plus an exhalation. They were told to avoid distracting thoughts and only to pay attention to their breath. This exercise focuses on the current breath and effectively enhances the subject’s awareness on the present moment.

3. **Mindfulness Meditation:** Mindfulness meditation focused on the present moment, although having awareness regarding internal sensation, thoughts and feelings. This mindfulness meditation process follows under the headings:

A) **Attending to the thinking process:** The purpose of this exercise is to bring subject’s awareness to their thoughts and feelings. Subjects become aware that how they are the architect of their personal thoughts. They were instructed to close their eyes and wonder what their next thought is going to be so that they become very observant and wait for the afterwards thought. This exercise has been continued for 10 days.

B) **Meditation on the bubble:** Subjects were instructed to observe their thoughts, release them and let them go without any judgement. For this, subjects continued the meditation in silence for a few minutes. After that they were asked to envision the bubble slowly rising up in front of them. They were told to visualize as if each bubble contains thoughts, feelings and perception. They were asked to notice the first bubble rising up and observe every thought slowly floating away with bubbles. The procedure was same with each bubble. Then they were asked to observe their mind going blank, and then visualize the bubble rising up with “blank” inside and slowly floating away. Another example like imagination of clouds was also included. This procedure has been continued for 10 days.

C) **Visualization Meditation: Finding a safe heaven:** This exercise is related to visualization in which subjects were instructed to visualize a place that they feel contented, peaceful and soothing. It might be a beach, lake, temple and their bed. Slowly the place is becoming clearer to them. They were asked to look at the surrounding of that place and walk around the place. They were asked to stay focused on that place, look closer at certain things and observe their own feelings. If they found that their thoughts were wandering, they were asked to monitor them, and then try to bring the image back in their place into focus in
front of them. Further, they were told that when they feel relaxed, they can open their eyes.

STATISTICAL ANALYSIS

The obtained data were subjected to various statistical analyses. These are descriptive statistics, Pearson product moment method of correlation and t-test.

SALIENT FEATURES OF THE STUDY

1. The present study reveals that attention is significantly correlated with memory (r= .55, p< .01). This finding supports the hypothesis no. 1 saying that there is positive significant relationship between attention and memory.

2. It has been found that there is significant correlation between attention and learning. It has been found that attention is inversely related with the variable learning (-.57) at .01 probability level which supports hypothesis no. 2 that there is significant relation between attention and learning. Here the lower score on learning is the indicator of better learning.

3. Learning has been correlated negatively with memory i.e. (r= -.53) which shows significant inverse relation at .01 probability level. It suggests that there is strong connection between each other. Here the lower mean score on learning is the indicator of better learning. This is in line with hypothesis no. 3 which reveals that there is significant relation between learning and memory.

4. Paired t-test scores from the pre-test to post-test indicate the effectiveness of mindfulness in increasing the capacity of attention. Mean score of 102.23 significantly increases to 178.71 on the variable of attention which indicates that the difference between pre-test and post-test is statistically significant (t = -22.05, p< .01). There is positive significant effect of mindfulness on attention. This finding supports the hypothesis no. 4 mentioning the significant effect of mindfulness on attention.

5. On the variable of learning mean score in pre-test is 18.06 and post-test is 8.8 which has been found significant and the positive effect of mindfulness has been demonstrated on learning. Here the lower mean score on learning is the indicator of better learning. This finding is in accordance of hypothesis no. 5 which states that mindfulness has significant effect on learning (t = 25.28, p<.01).
6. The outcomes on the variable of memory between pre-test and post-test proved statistically significant. Mean score of 6.8 at pre-test significantly increased to 17.7 at post-test ($t = -24.36, p < .01$) which proves the hypothesis no. 6 stating that there is significant effect of mindfulness on memory.

7. Significant difference between means on the variable of attention between boys and girls has been obtained ($t=2.47, p<.05$) proving the hypothesis no. 7 which reveals that there is significant difference in attention between boys and girls. Girls have been found to have better level of attention than the boys.

8. It has been found that on the variable of learning, girls’ means score is 11.61 and boys’ means score is 10.95 and the obtained t value is 2.41 which is significant at .05 probability level. The lower mean score on learning is the indicator of better learning. In this line hypothesis no. 8 has been accepted which states that there is significant difference in learning between boys and girls.

9. The mean for girls on the variable of memory was 14.58 and for boys was 13.83 ($t = 2.33; p < .05$). This finding supports hypothesis no. 9 which states that there is significant difference in memory between boys and girls.

10. Present research also analyzed attention, learning and memory scores based on quartile distribution established from the participants with lowest pre-test scores and highest pre-test scores. The result of the present study concludes that the intervention program of mindfulness is successfully effective in improving attention, learning and memory in of adolescents.